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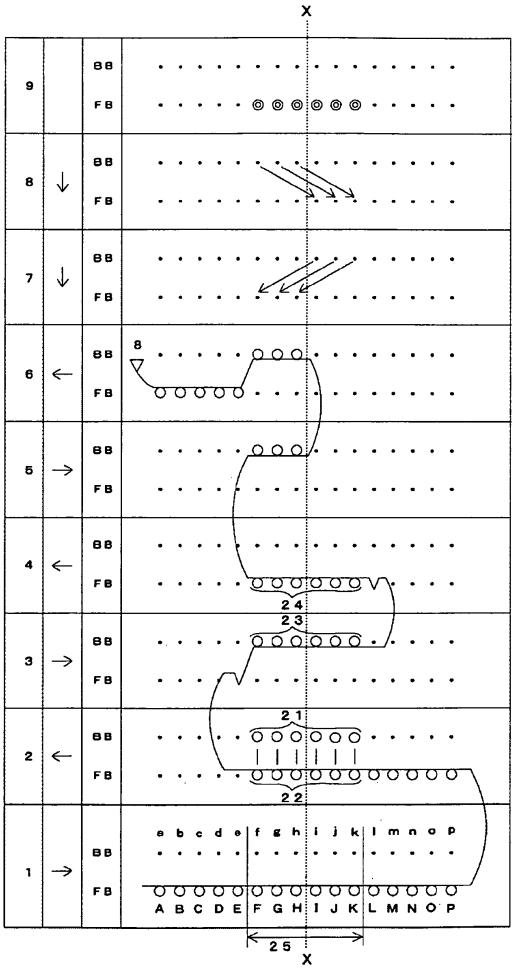
(54) Knitting method for a knitted fabric having a bifurcation part, and the knitted fabric

(57) **[Object]** The present invention aims to provide a knitting method for knitting a bifurcation part of a knitted fabric in such a manner as to have an adequate tensile strength while giving a refined appearance when the stitches on the right and left sides are crossed, and the knitted fabric.

[Technical Solution] When a knitted fabric is divided into right and left parts at a bifurcation part by using a flatbed knitting machine, stitches are knitted on the front side within a bifurcation area. When widening stitches are knitted by using empty needles on the back side within the bifurcation area, the widening stitches and the stitches on the front side confronting the widening stitches are connected to each other. Then, new loops are successively knitted on the widening stitches, and the stitches on the front side which lie on either side of the boundary line of the bifurcation part are not crossed, while the stitches on the back side which lie on either side of the boundary line of the bifurcation part are crossed, whereby the bifurcation part is formed.

Fig. 2



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Description

[Technical Field]

[0001] The present invention relates to a knitting method for knitting a knitted fabric having a bifurcation part to allow division into right and left parts at a widthwise intermediate part thereof, in such a manner as to have a refined appearance of the bifurcation part, and to the knitted fabric.

[Background Art]

[0002] The knitted fabrics having bifurcation to allow division into right and left parts at a widthwise intermediate part thereof include, for example, a V-neck vest or sweater. When a front body of the V-neck vest is knitted, for example, its full width part is first knitted up to a course of loops where the bifurcation part of neck is defined, using a single yarn feeder. Then, the full width part is divided into a left shoulder part and a right shoulder part at the bifurcation part, to form the neck. The yarn feeder used for the knitting of the full width part is used for the knitting of one of the shoulder parts, while a different yarn feeder is used for the knitting of the other shoulder part. When wearing, this V-neck vest undergoes a horizontal tensile force at the bifurcation part. If the tensile force acting on the yarn in the bifurcation part exceeds the stretch limit of the yarn, then yarn breakage may be caused at the bifurcation part. The applicant of this application previously offered a suggestion on reinforcement of the bifurcation part by use of the crossing of widening loops (Patent Citation 1).

[Prior Art Documents]

[Patent Citation]

[0003] [Patent Citation 1] Japanese Patent No. 3967922

[Disclosure of the Invention]

[Technical Problem]

[0004] It is an object of the present invention to provide an improved knitting method of Patent Citation 1 for knitting the knitted fabric having the bifurcation part having adequate tensile strength with its crossing part invisible, and to provide the knitted fabric.

[Technical Solution]

[0005] The present invention provides a knitting method for knitting a knitted fabric having a bifurcation part formed by crossing at least a pair of stitches which lie on either side of a boundary line of the bifurcation part to form a crossing part when the knitted fabric is divided into right and left parts at the bifurcation part, using a flatbed knitting machine having at least one pair of front and back needle beds,

[0006] wherein when stitches are knitted on the front side within a bifurcation area and widening stitches are knitted by using empty needles on the back side within the bifurcation area, the widening stitches and the stitches on the front side confronting the widening stitches are connected to each other, wherein new loops are knitted on the widening stitches, and wherein the stitches on the front side which lie on either side of the boundary line of the bifurcation part are not crossed, while the stitches on the back side which lie on either side of the boundary line of the bifurcation part are crossed, whereby the bifurcation part is formed.

[0007] In the knitting method of the invention, the widening stitches knitted by using the empty needles on the back side within the bifurcation area may be widening stitches formed by split knit.

[0008] In the knitting method of the invention, the widening stitches knitted by using the empty needles on the back side within the bifurcation area may be widening stitches resulting from pick-up stitches which are held on the empty needles and are formed into twisted stitches.

[0009] Further, the present invention provides a knitted fabric knitted by using a flatbed knitting machine and having a bifurcation part at which the knitted fabric is divided into right and left parts at a widthwise intermediate part thereof,

[0010] wherein the knitted fabric has not-crossed stitches on the front side within a bifurcation area, wherein widening stitches are knitted on the back side within the bifurcation area and the widening stitches and the stitches on the front side confronting the widening stitches are connected to each other, wherein new loops are knitted on the widening stitches, and wherein the stitches on the back side which lie on either side of the boundary line of the bifurcation part

are crossed.

[Advantageous Effects]

[0011] According to the present invention, the widening stitches are formed on the back side within the bifurcation area and also the widening stitches thus formed are crossed with new loops connecting to the widening stitches which lie on either side of the boundary line of the bifurcation part on the back side only. As a result of this, the stitches on the front side within the bifurcation area are not affected by the crossing and thus the stitches on the front side are kept in the non-crossing state and remain good appearance. Also, since the stitches on the back side which lie on either side of the boundary line of the bifurcation part are crossed in the state of being hidden behind the stitches on the front side, the knitting yarn used can be increased in number and thus in strength.

[0012] Also, the widening stitches knitted by using the empty needles on the back side within the bifurcation area are widening stitches formed by split knit. The split knit can be done in the process of forming of the new loops. Since the new loops and the widening stitches can be formed concurrently, the knitting can be made efficiently. Further, since the stitches forming a line on the front side are connected and knitted under equal conditions, the stitches can have uniform loop quality to contribute to a beautiful appearance.

[0013] The widening stitches knitted by using the empty needles on the back side within the bifurcation area may alternatively be widening stitches resulting from pick-up stitches which are held on the empty needles and are formed into twisted stitches. This enables the use of the knitting machine which does not have the split knit function.

[0014] In the knitted fabric of the present invention, the bifurcation area consists of the front side and the back side. Since the front side is not crossed but knitted in the same condition as the knitting fabric around the bifurcation part, the knitted fabric is finished to have a beautiful external appearance. Also, since the stitches on the back side which lie on either side of the bifurcation part are crossed, the knitted fabric whose bifurcation part has an increased tensile strength is produced.

[Brief description of drawings]

[0015]

[Fig.1] Fig. 1 is a view showing a front body 1 of a V-neck vest 10 of a certain embodiment of the present invention,
[Fig.2] Fig. 2 is a knitting diagram of a bifurcation part 2 of the front body 1 of Embodiment 1 of the present invention,
[Fig.3] Fig. 3 is a knitting diagram of a bifurcation part 2 of the front body 1 of Embodiment 2 of the present invention,
[Fig.4] Fig. 4 is a knitting diagram of the part following to the bifurcation part 2 of the front body 1 of Embodiment 2 of the present invention, and
[Fig.5] Fig. 5 is a view showing a front body 41 of a square-neck vest 40, representing alternative to which the present invention is applicable.

[Mode for Carrying out the Invention]

[0016] In the following, the bifurcation part 2 is explained by way of an example of the present invention. A flatbed knitting machine used for the knitting is a two-bed type one comprising a pair of front and back needle beds, which are structured so that the back needle bed can be lacked relative to the front needle bed and a plurality of yarn feeders arranged over the needle beds. For explanatory convenience, a fewer number of needles than the actual number of needles used for the knitting is shown in the knitting diagram.

[Embodiment 1]

[0017] Fig. 1 is a view showing a front body 1 of a V-neck vest 10. Each of the front bodies 1 of the vests illustrated herein is knitted by plain knitting. The front body 1 consists of a full width part 4 which is knitted up to the bifurcation part 2 in the direction of an arrow W in the drawing, a right shoulder part 6 and a left shoulder part 7 into which the full width part 4 is divided at the bifurcation part 2. The full width part 4 and the right shoulder part 6 are knitted using a yarn feeder 8, and the left shoulder part 7 is knitted using a yarn feeder 9. Broken line X-X indicates a boundary line of the bifurcation part 2.

[0018] Fig. 2 is a knitting diagram of the bifurcation part 2 of Embodiment 1 shown in Fig. 1. In this knitting diagram, numerical characters at the left side indicate knitting steps (S). Horizontal arrows indicate a knitting direction, and vertical arrows indicate a stitch transfer direction. FB designates a front needle bed, and BB designates a back needle bed. Capital alphabetical letters A-P indicate needles of FB, and small alphabetical letters a-p indicate needles of BB. Single circles indicate new loops formed or loops transferred in the knitting step. V configurations indicate tuck or pick-up

stitches. Double circles indicate double stitches. It is to be noted that stitches not related to the knitting in the knitting steps and remaining retained by the knitting needles are not shown in the drawings. Line X-X indicates a boundary line of the bifurcation part 2, as is the case of Fig. 1. The FB side is sometimes represented as the front side, while the BB side is sometimes represented as the back side. The contents noted above apply to Figs. 3 and 4 as well illustrating Embodiment 2 mentioned later.

[0019] Now, the knitting steps S1-S9 shown in Fig. 2 are explained. In S1, which illustrates the knitting of the full width part 4 of the front body 1, the yarn feeder 8 is moved rightwards by means of a carriage (not shown) and stitches are formed with knitting needles A-P of FB.

[0020] In S2, stitches are formed to the left side with knitting needles P-F. In Fig. 1, the start of the V-neck is illustrated as the bifurcation part 2. Concretely, the knitting needles P-F holding the stitches of that structure form a bifurcation area 25. In this step, the split knit is performed, using knitting needles K-F In the split knit, new stitches 22 are formed using the knitting needles K-F of FB which are on the front side of the bifurcation area 25, while at the same time, the stitches formerly held by the knitting needles K-F are transferred to and are held onto the knitting needles k-f of BB which are on the back side of the bifurcation area 25. As a result of this, widening stitches are formed on the knitting needles k-f of BB. Of course, the stitches 22 which are on the front side of the bifurcation area 25 connect to the confronting stitches 21 which are on the back side of the same.

[0021] In S3, the stitch held by the knitting needle E of FB is tucked to the right side and subsequently stitches 23 are formed with the knitting needles f-k of BB. In S4, the stitch held by the knitting needle L of FB is tucked to the left side and subsequently stitches 24 are formed with the knitting needles K-F of FB. In S3 and S4, tubular knit is performed for the bifurcation area 25, for facilitation of the knitting. In the split knit, the stitches 21 of BB are each split into the widening stitches. The widening stitches thus formed are each small in loop size. The tubular knit can allow such small loops to enlarge and thus can facilitate the subsequent knitting. In place of S4, an alternative knitting step using the knitting needles k-f of BB opposite in direction to S3, or interlock knitting wherein alternate loops are formed so that one course of loops can be formed as a whole in alternate knitting steps of S3 and S4, may be used. The tuck stitch is not indispensable because it is related to shapeliness or decorativeness.

[0022] In S5, stitches are formed to the right side with knitting needles f-h of BB. In S6, stitches are formed to the left side with knitting needles h-f of BB and E-A of FB. In S5 and S6, known separation knitting is used. The more is the number of stitches crossed, like 3x3, 4x4, the more effective the separation knitting becomes and thus facilitates the knitting. It is needless to say that depending on the conditions of knitting yarns or stitches, the knitting can be made without the separation knitting.

[0023] In S7 and S8, only the stitches which are on the back side and lie on either side of the boundary line of the bifurcation part are crossed to be in the form of the crossing part connecting to the widening stitches. In S7, the stitches held by the knitting needles i-k of BB are transferred to the knitting needles F-H of FB. In S8, the stitches held by the knitting needles f-h of BB are transferred to the knitting needles I-K of FB. In the crossing, three needles of stitches are moved and the crossing of 3x3 is provided in the crossing part. In S9, the stitches which are on the back side and lie on either side of the boundary line of the bifurcation part are crossed and overlapped with the stitches 24 on the front side held by the knitting needles F-K of FB. When horizontal tensile force is applied to the bifurcation part, the force is dispersed at the crossing part of 3X3 on the back side of the bifurcation part and thus the yarn breakage and the like is prevented. Although in the illustration, the stitches crossed on the back side are overlapped with the stitches on the front side, they need not be overlapped necessarily. In a four-bed flatbed knitting machine or a flatbed knitting machine having special jacks for loop transfer use, after the stitches are crossed and held by the knitting needles on the back side, the V-neck of the right shoulder part 6 and left shoulder part 7 may be knitted in a tubular form, with the stitches held in tubular form by the knitting needles on the front and back sides.

[Embodiment 2]

[0024] Fig. 3 is a knitting diagram of Embodiment 2 of the bifurcation part 2 shown in Fig. 1. Fig. 4 is a knitting diagram of the part continuous to the bifurcation part 2 of Fig. 3. In the following, the knitting steps S1-S21 shown in Figs. 3 and 4 are explained. In S1, which illustrates the knitting of the full width part 4 of the front body 1, the yarn feeder 8 is moved rightwards by means of a carriage (not shown) and stitches are formed with knitting needles A-P of FB.

[0025] In S2, stitches are formed to the left side with knitting needles P-L. In S3, a pick-up stitch is formed to the right side with the knitting needle k of BB. In the next S4, a new stitch is formed to the left side with the knitting needle K. Through the movement of the yarn feeder in S2-S4, the pick-up stitch formed in S3 is twisted, and the twisted stitch on the back side and the stitch on the front side in the bifurcation area 35 confront and connect to each other. Thereafter, in S5-S14, the knitting process that a pick-up stitch is formed with the knitting needle of BB and then a new stitch is formed on the confronting stitch held by the knitting needle of FB proceeds one by one towards the knitting needle F, f in the same fashion as in S3 and S4. The interval between the knitting needles K and F forms the bifurcation area 35.

[0026] In S15, the stitch held by the knitting needle E of FB is tucked and subsequently stitches 31 are formed with

the knitting needles f-k of BB which are on the back side of the bifurcation area 35. In S16, the stitch held by the knitting needle K of FB is tucked to the left side and subsequently stitches 32 are formed with the knitting needles J-F of FB which are on the front side of the bifurcation area 35. In S15 and S16, the tubular knit is used for the front and back knitted fabrics, as is the case with Embodiment 1, to allow for a stretch margin of the stitch stretched by the stitch on the back side when crossed in the crossing part as mentioned later. Also, the tuck can allow the stitch 30 widened by the twisted stitch to reliably connect to the knitted fabric outside the bifurcation area 35 and can also allow a stable condition of the stitch.

[0027] In S17, a stitch 33 is formed to the right side with knitting needles i-k of BB. In S18, a stitch 34 is formed to the left side with knitting needles h-f of BB and a stitch is formed with knitting needles E-A of FB. In S17 and S18, the separation knitting is used. In S19 and S20, the stitches which are on the back side and lie on either side of the boundary line of the bifurcation part are crossed to form the crossing part. In S19, the stitches held by the knitting needles i-k of BB are transferred to the knitting needles F-H of FB. In S20, the stitches held by the knitting needles f-h of BB are transferred to the knitting needles I-K of FB, which means that the crossing of 3x3 is done in the crossing part. In S21, the crossed stitches are overlapped with the respective stitches held by the knitting needles F-K of FB. Although the formation of the bifurcation part 2 is finished with this crossing, as is the case with Embodiment 1, the formation of the double stitches is not indispensable. It is desirable for the bifurcation part 2 to be fit to be connected to the V-neck knitted subsequently to the bifurcation part 2.

[0028] Fig. 5 is a view showing a front body 41 of a square-neck vest 40, representing alternative to which the present invention is applicable. This square-neck vest 40 is knitted to a neighborhood of the bifurcation part 42 in the same manner as the part of the V-neck vest of Fig. 1 extending to the bifurcation part 2. After being bifurcated at the bifurcation part 42 on the right side of page space, the square-neck vest 40 is bound off on its bind-off part 43 in a leftward direction of page space. Since the bifurcation part 42 is bound off, when a horizontal tensile force acts on that bifurcation part 42, there is a possibility that the bifurcation part 42 may be split or stretched out. The present invention is also applicable to such a bifurcation part 42, providing the advantages that the stitches of the bifurcation part 42 can have a refined appearance and also can be prevented from being stretched out. Further, the present invention is applicable to a bifurcation part 45 of the square-neck vest 40 which is slit up at 44 in a lower part thereof, for decorative purposes. In either of the bifurcation part 42 to connect to the large opening and the bifurcation part 45 to connect to the slit 44, the present invention can allow the stitches on the front side to appear to be similar to surrounding well-looking stitches and also can ensure an adequate strength by the crossed stitches on the back side. Changes and modifications to allow the bifurcation part to have a refined appearance and an adequate strength may be made without departing from the spirit and scope of the invention.

[0029] While the crossing of 3X3 has been illustrated as an example of the crossing of the widened stitches on the back side in the bifurcation area, the crossing process is not limited to the one disclosed in Embodiments. Further, in relation to the sequence of the stitch transference for the crossing, either of the stitches on the right side and the stitches on the left side may be transferred first. Since the stitches on the back side are hidden behind the stitches on the front side to solve the visual problem, the sequence of the stitch transference can be selected from a viewpoint of easy-to-knit in relation to the knitting such as the separation knitting.

[Explanation of References]

[0030]

1,41	Front body
2, 42, 45	Bifurcation part
6	Right shoulder part
7	Left shoulder part
8, 9	Yarn feeder
10	V-neck vest
22, 23, 31, 32, 33	Stitch

Claims

1. A knitting method for knitting a knitted fabric having a bifurcation part formed by crossing at least a pair of stitches which lie on either side of a boundary line of the bifurcation part to form a crossing part when the knitted fabric is divided into right and left parts at the bifurcation part, using a flatbed knitting machine having at least one pair of front and back needle beds,
wherein when stitches are knitted on the front side within a bifurcation area and widening stitches are knitted by using empty needles on the back side within the bifurcation area, the widening stitches and the stitches on the front side confronting the widening stitches are connected to each other, wherein new loops are knitted on the widening stitches, and wherein the stitches on the front side which lie on either side of the boundary line of the bifurcation part are not crossed, while the stitches on the back side which lie on either side of the boundary line of the bifurcation part are crossed, whereby the bifurcation part is formed.

2. The knitting method for knitting the knitted fabric having the bifurcation part according to Claim 1, wherein the widening stitches knitted by using the empty needles on the back side within the bifurcation area are widening stitches formed by split knit.

3. The knitting method for knitting the knitted fabric having the bifurcation part according to Claim 1, wherein the widening stitches knitted by using the empty needles on the back side within the bifurcation area are widening stitches resulting from pick-up stitches which are held on the empty needles and are formed into twisted stitches.

4. A knitted fabric knitted by using a flatbed knitting machine and having a bifurcation part at which the knitted fabric is divided into right and left parts at a widthwise intermediate part thereof,
wherein the knitted fabric has not-crossed stitches on the front side within a bifurcation area, wherein widening stitches are knitted on the back side within the bifurcation area and the widening stitches and the stitches on the front side confronting the widening stitches are connected to each other, wherein new loops are knitted on the widening stitches, and wherein the stitches on the back side which lie on either side of the boundary line of the bifurcation part are crossed.

Fig. 1

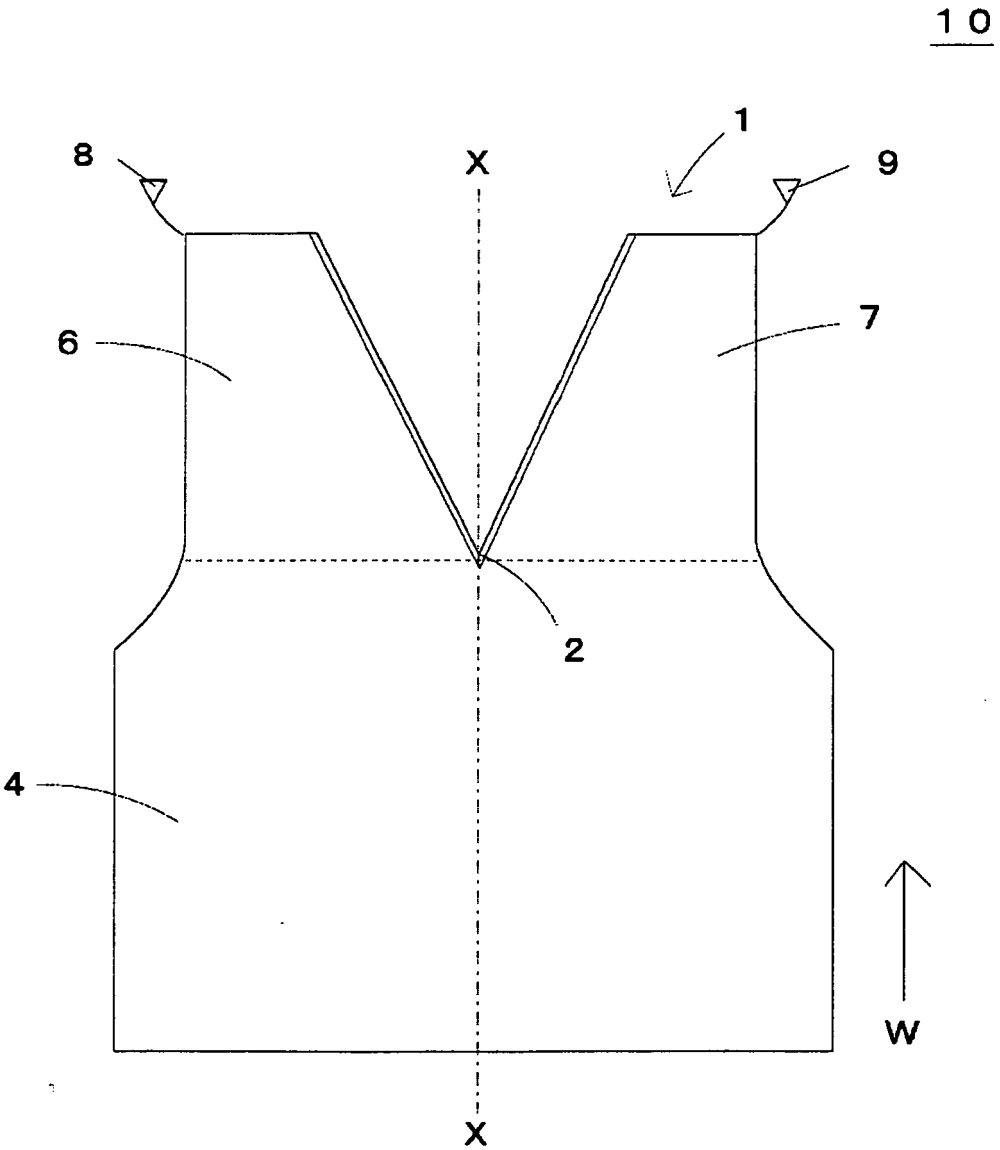

Fig. 2

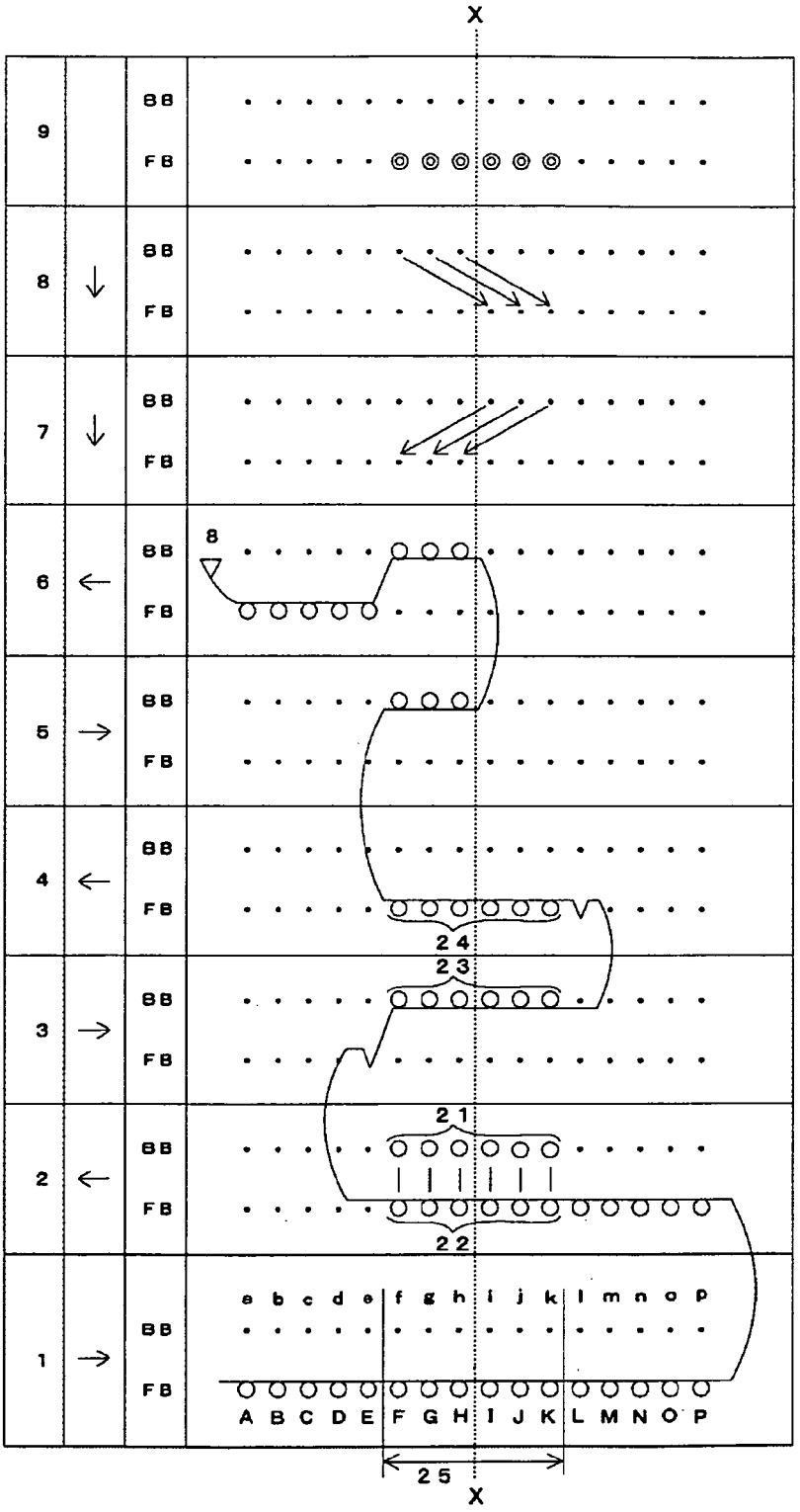
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Fig. 3

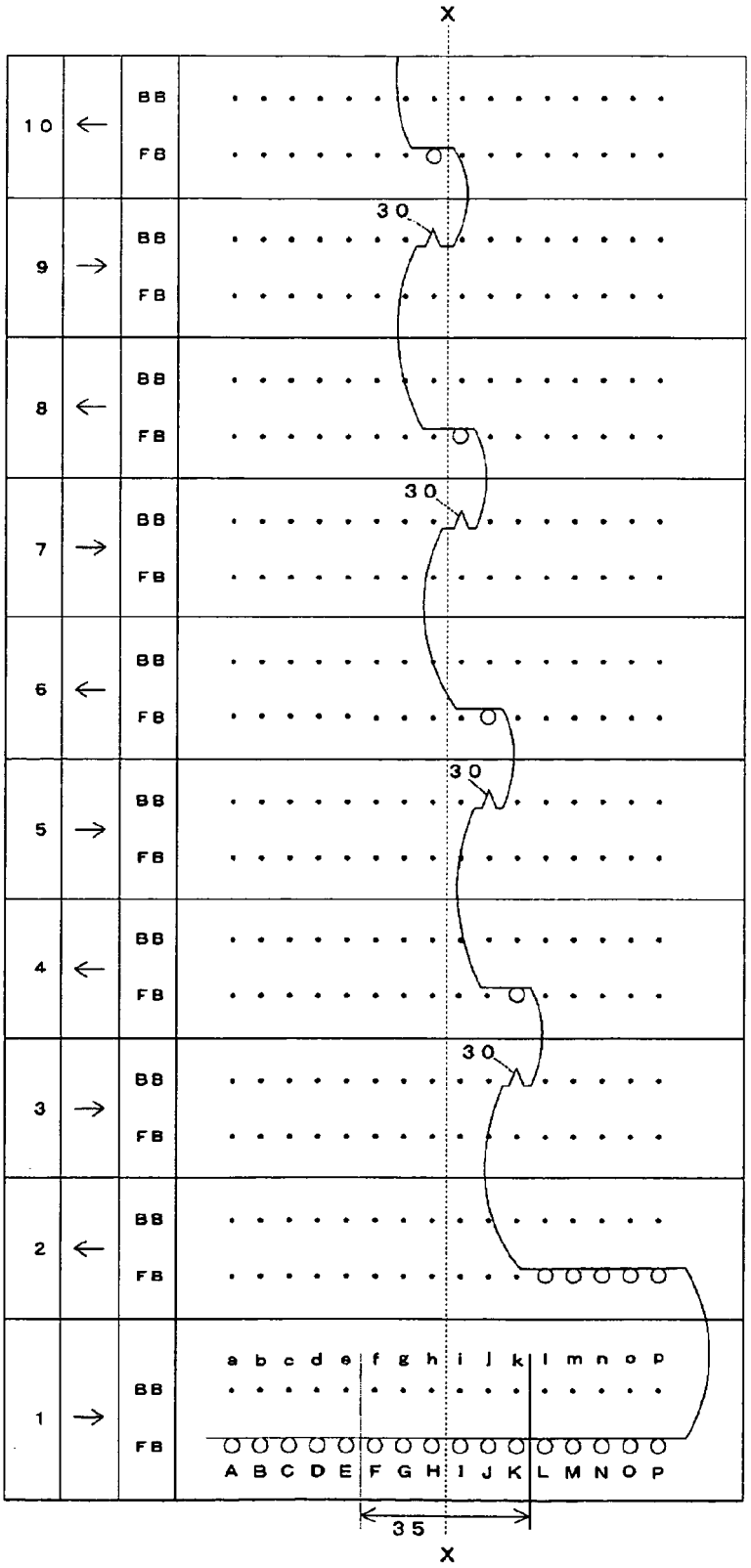
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Fig. 4

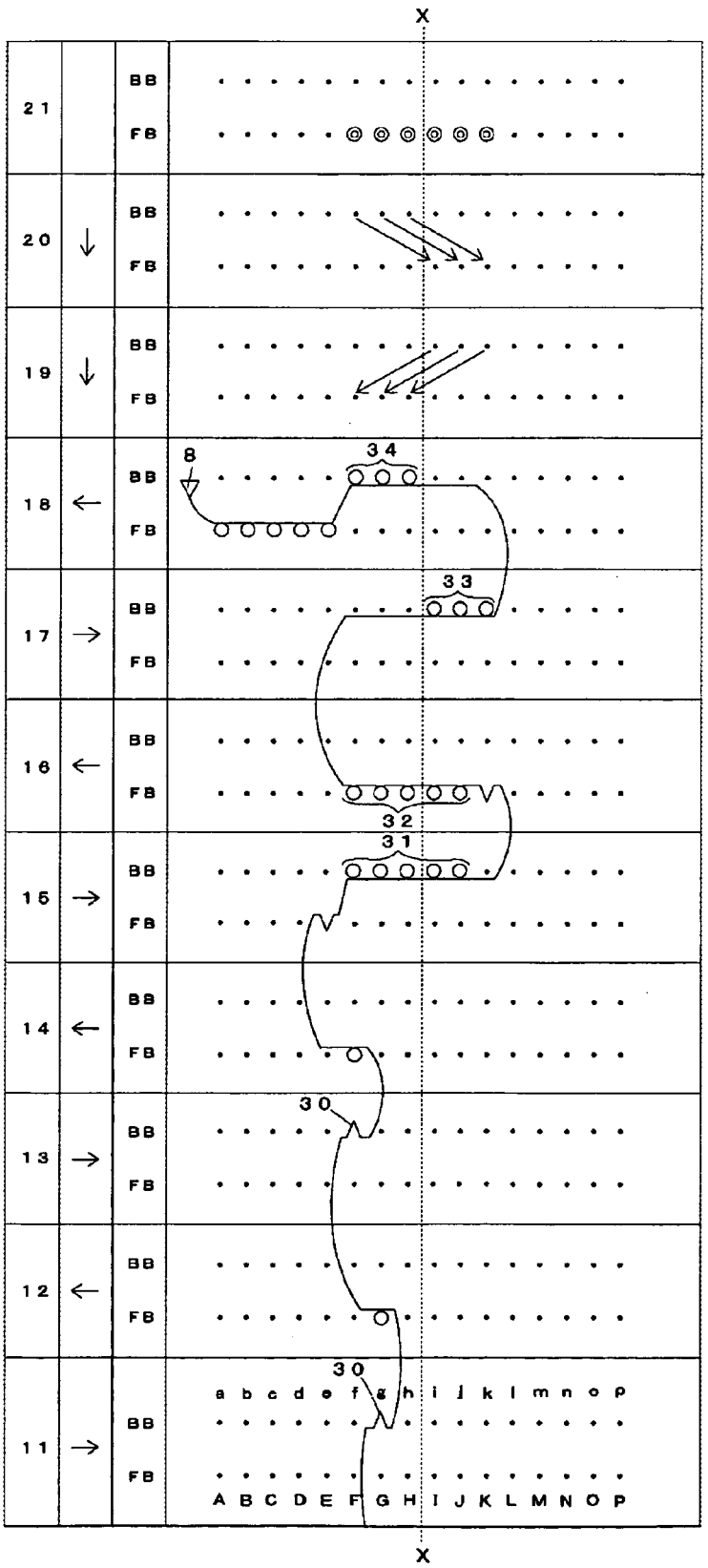
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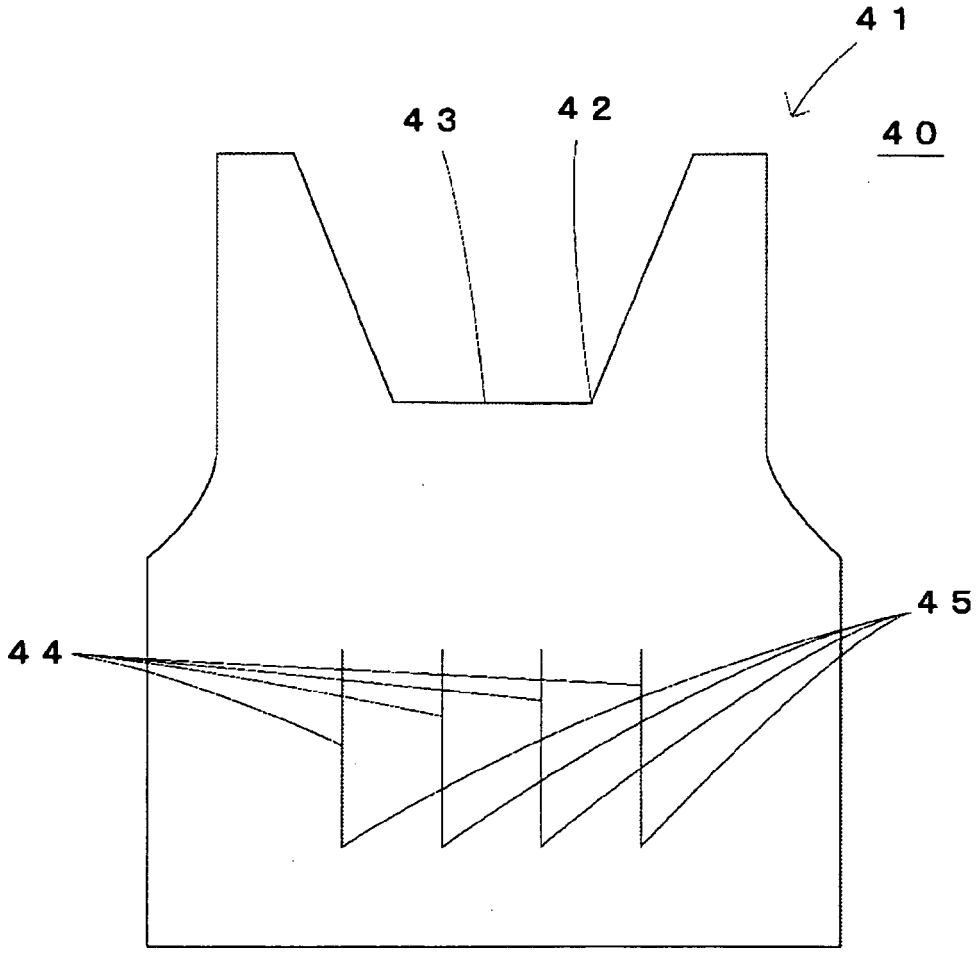
Fig. 5



REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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